

Rendering of 3D Mandelbrot, Lambda and other sets using 3D complex number system

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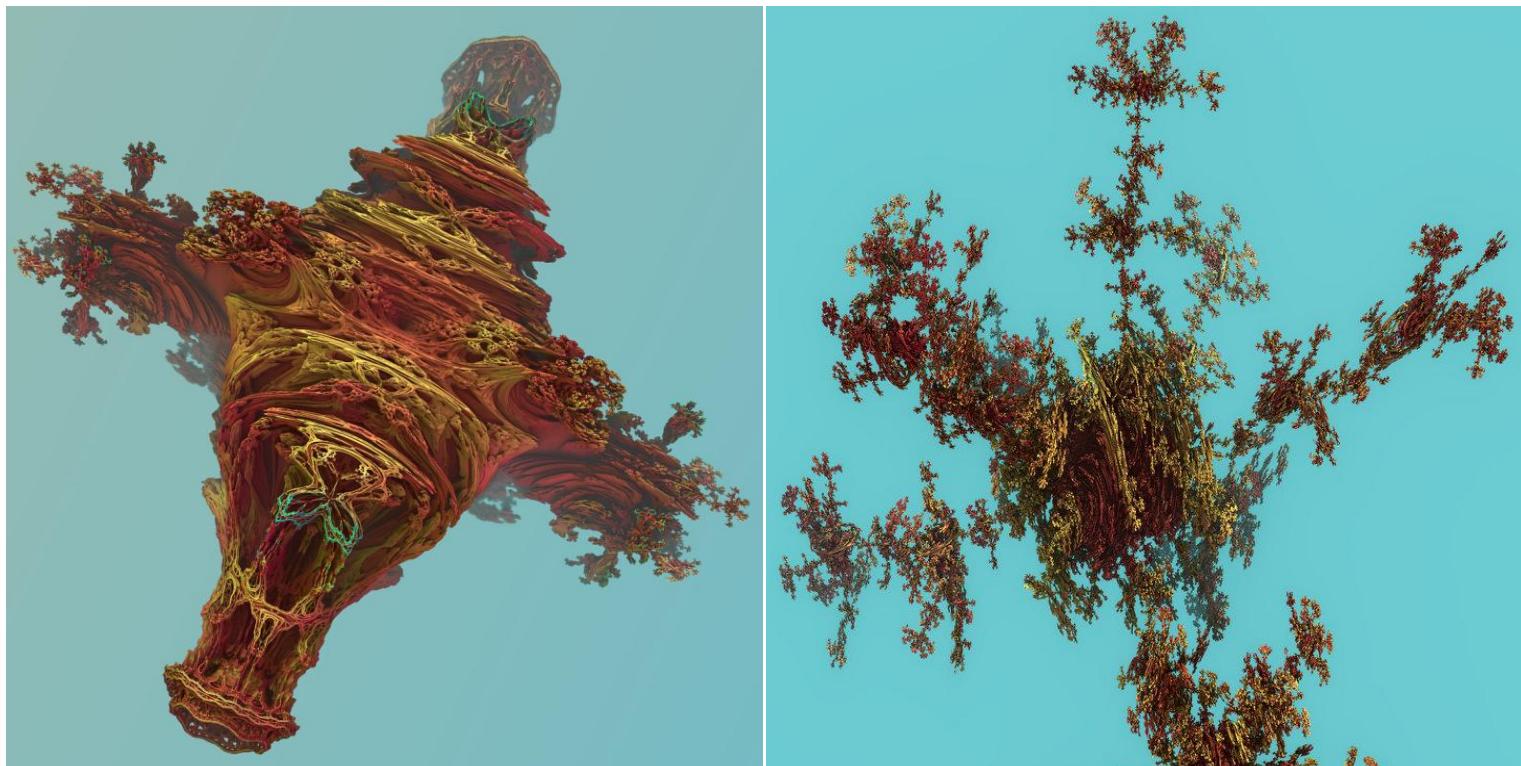
Image credit: Edgar Malinovsky

7 April 2022

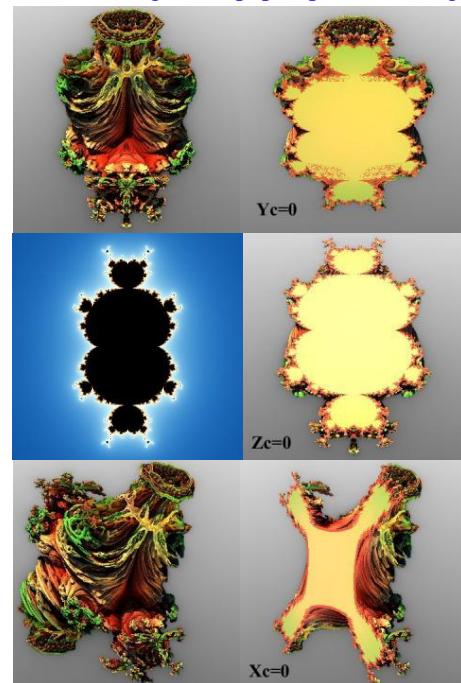
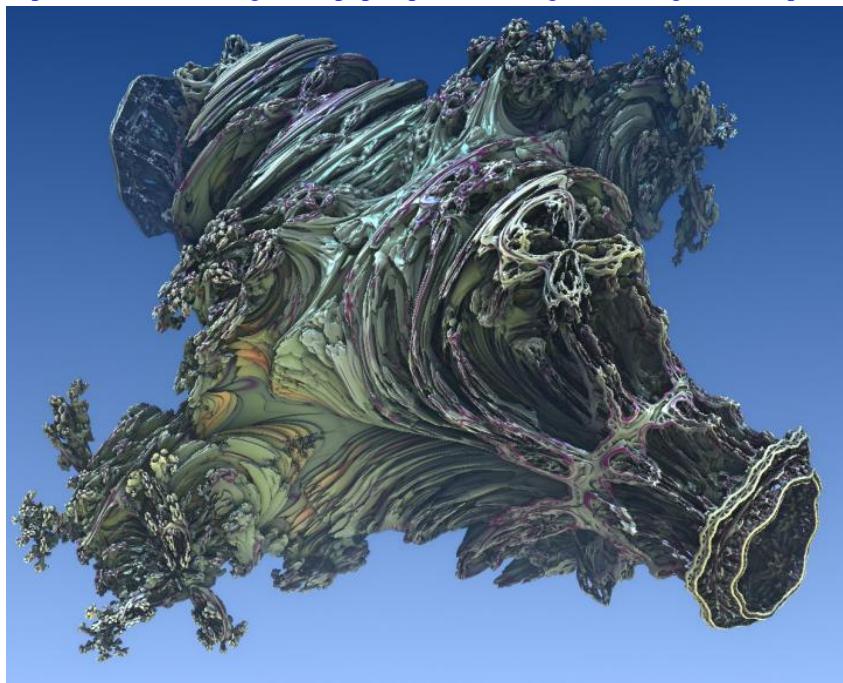
I have constructed a [complex number system with 3 or more dimensions](#) (for [Download](#)). Edgar Malinovsky used my 3D system to render 3D Mandelbrot set, Lambda set and corresponding Julia sets. I have assembled the most beautiful and representative images of these 3D objects in the present document.

Mandelbrot set to the power 3 : $z_{n+1} = z_n^3 + c$, [Original Web page](#)

Zoom of the left object, [Original Web page](#)



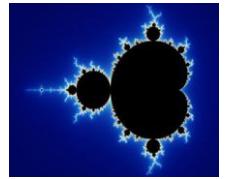
<https://fractalforums.org/index.php?topic=4675.msg33540#msg33540> <https://fractalforums.org/index.php?topic=4675.msg33549#msg33549>



The 2D Mandelbrot set is generated using this equation: $z_{n+1} = z_n^2 + c$

The 2D Mandelbrot set image is on the right.

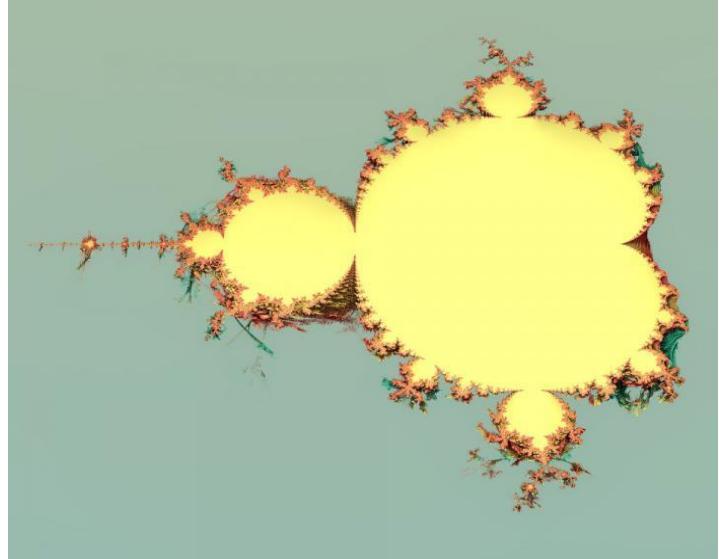
The 3D Mandelbrot set is generated by replacing z with 3D z in the equation above. The image of the 3D Mandelbrot set is below.



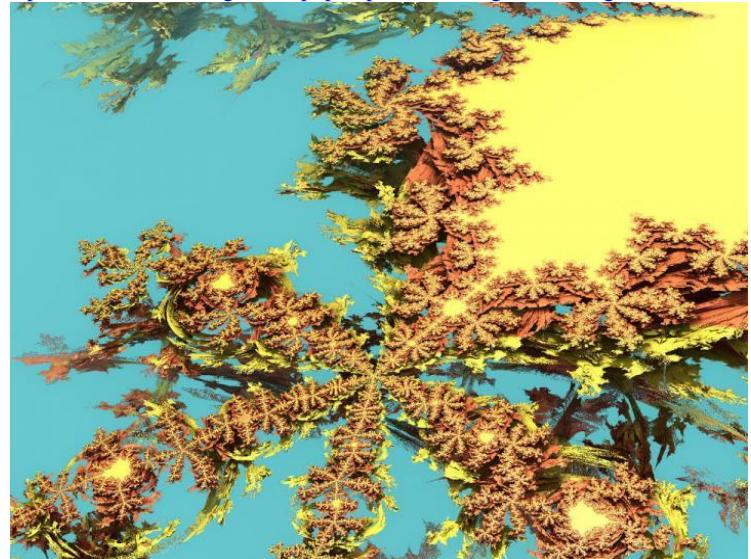
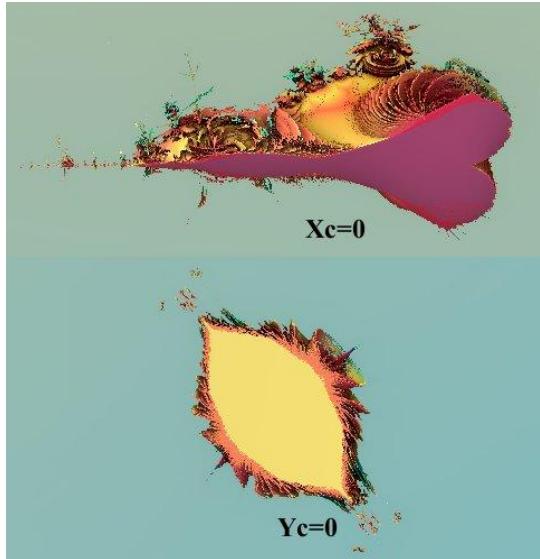
Mandelbrot set: $z_{n+1} = z_n^2 + c$, [Original Web page](#)



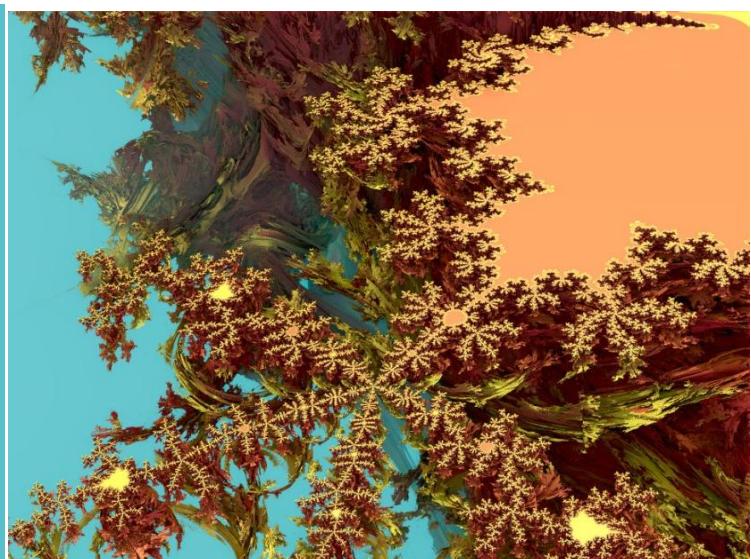
Cutout of the left object, [Original Web page](#)



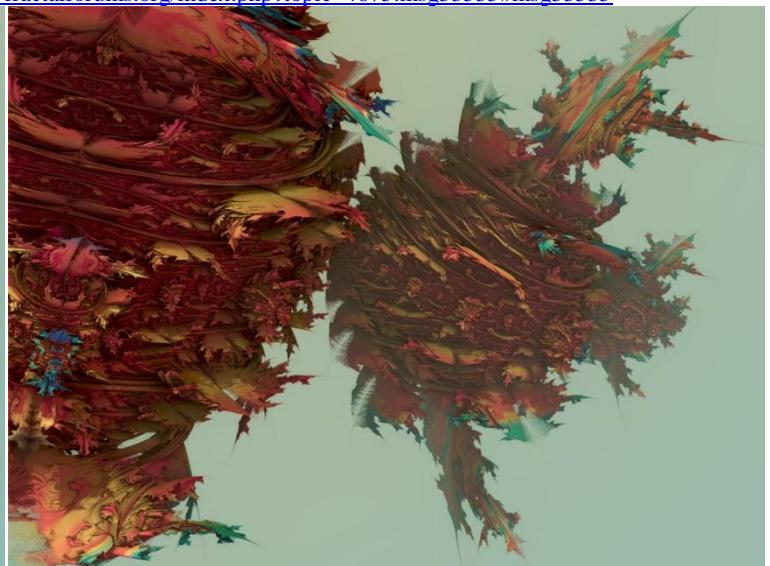
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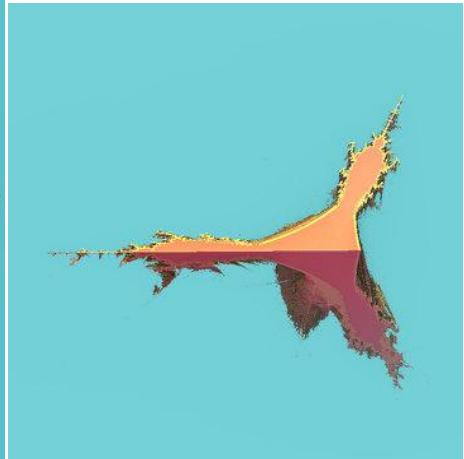
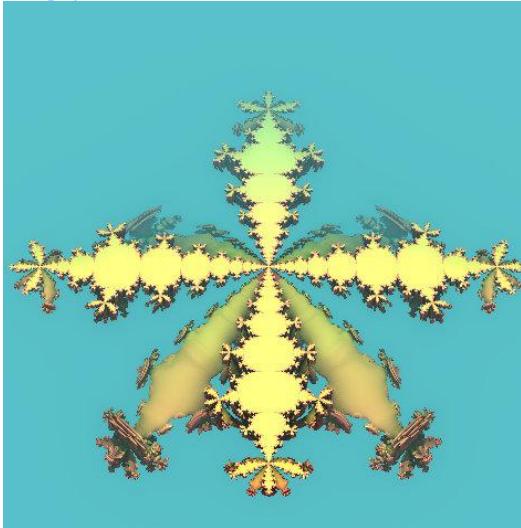
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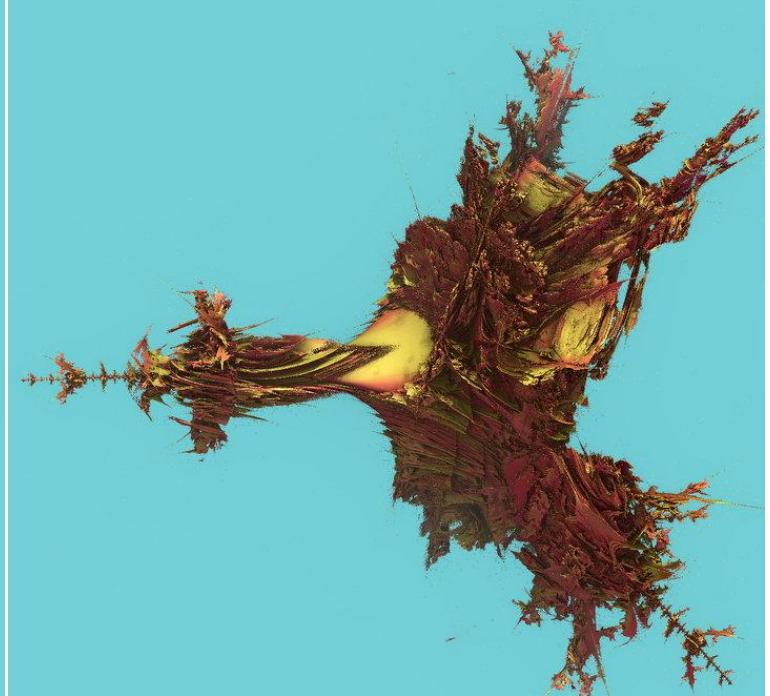
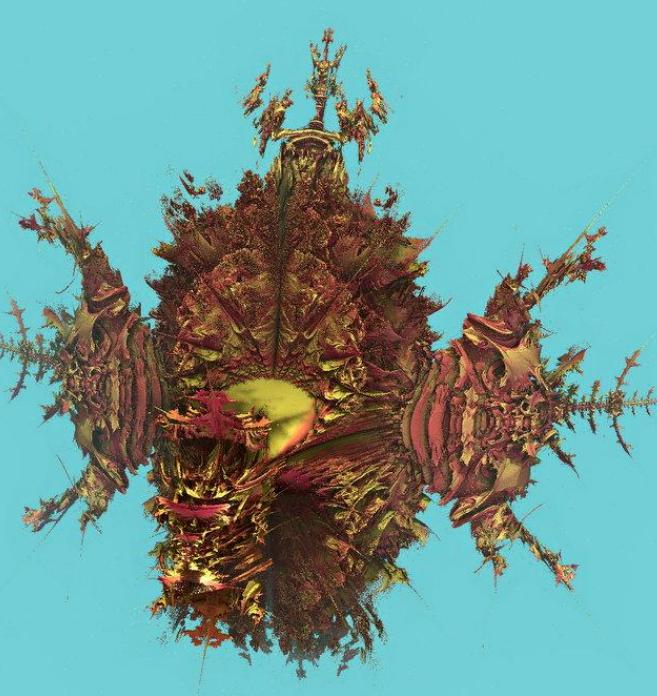
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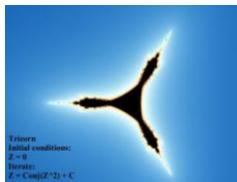
Julia set: $z_{n+1} = cz_n^4 - cz_n^5$, seed (1,0,0), [Original Web page](#)



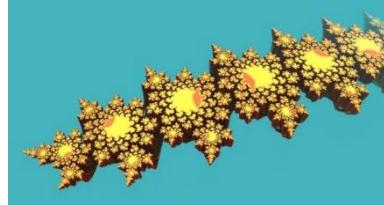
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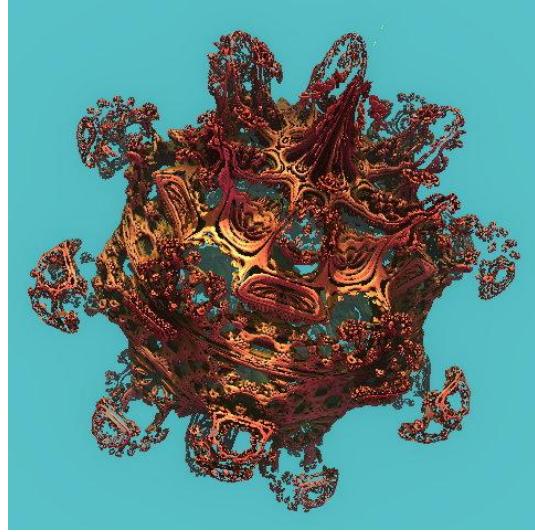
The 2D Tricorn image is on the right. $z_{n+1} = \text{conj}(z_n^2) + c$
Tricorn set to the power 3 : $z_{n+1} = \text{conj}(z_n^3) + c$,
[Original Web page 1](#),
[Original Web page 2](#)



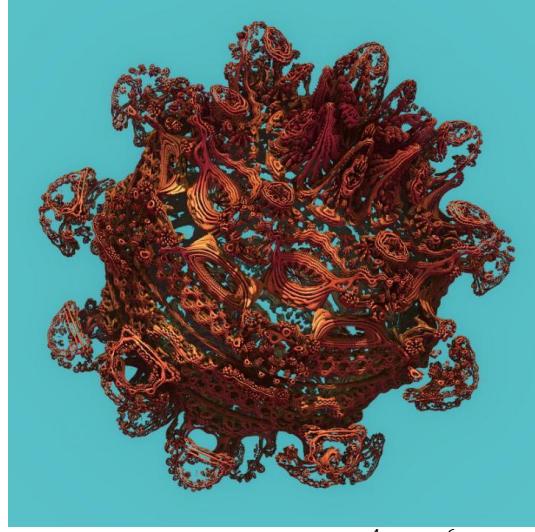
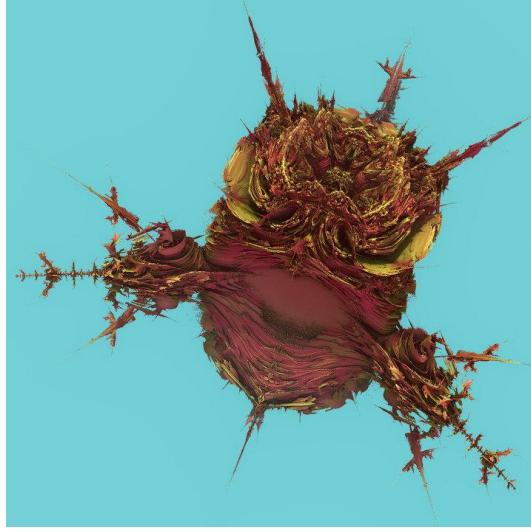
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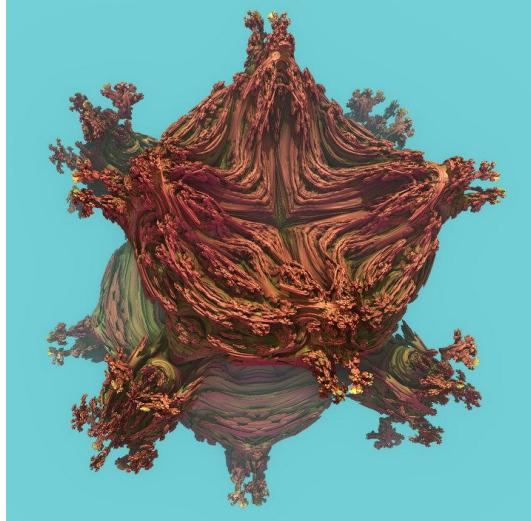
$z_{n+1} = cz_n^6 - cz_n^5$, seed (1,0,0), [Original Web page](#)



$z_{n+1} = cz_n^7 - cz_n^6$, [Original Web page](#)



Generalized logistic map: $z_{n+1} = cz_n^4 - cz_n^6$,
[Original Web page](#)



Original Web pages: [page 1](#), [page 2](#), [page 3](#), [page 4](#)

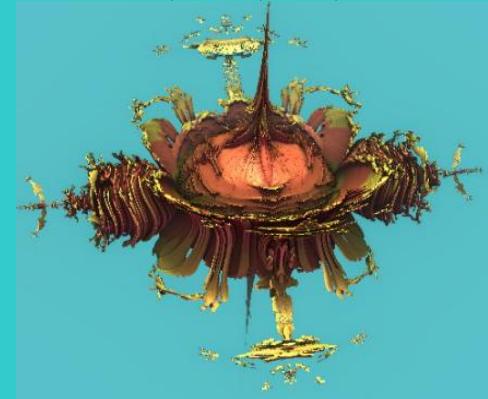
3D Lambda set: $z_{n+1} = cz_n - cz_n^2$



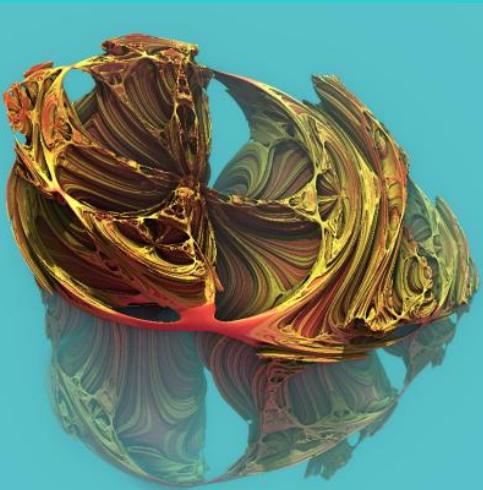
Left object Cutout for $z=0$



$z_{n+1} = cz_n^2 - cz_n^3$



3D Lambda Julia set



Left object Cutout for $z=0$



$z_{n+1} = cz_n^3 - cz_n^4$



3D Lambda set: $z_{n+1} = cz_n^4 - cz_n^5$



Left object Cutout for $z=0$



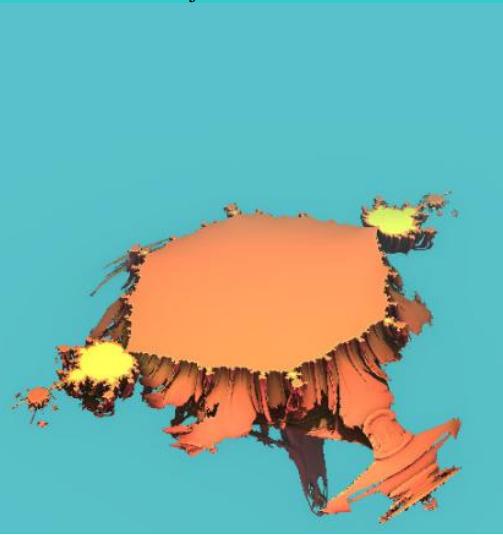
$z_{n+1} = cz_n^4 - cz_n^6$



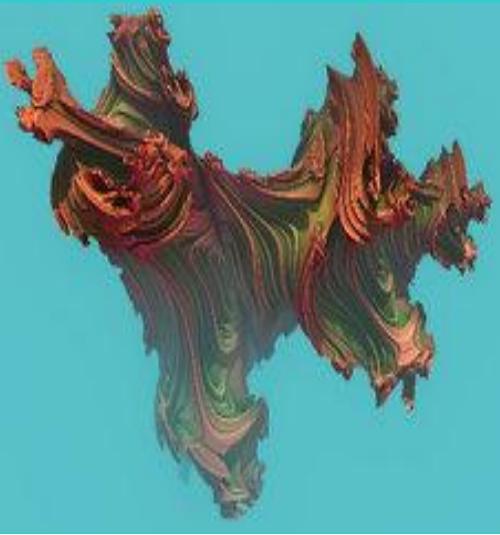
3D Lambda set: $z_{n+1} = cz_n^2 - cz_n^4$



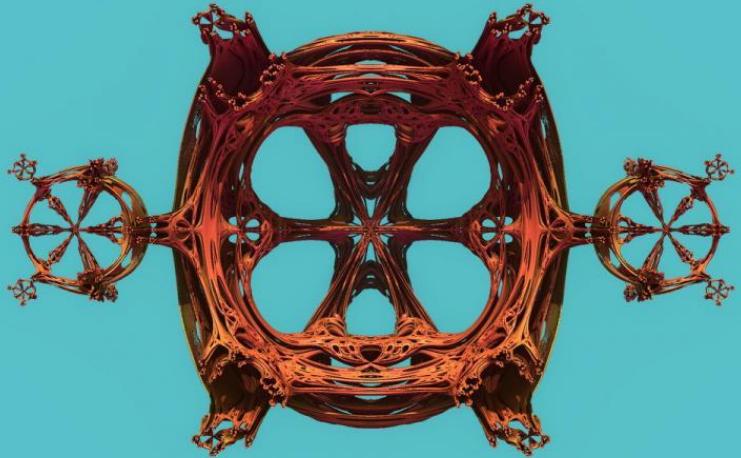
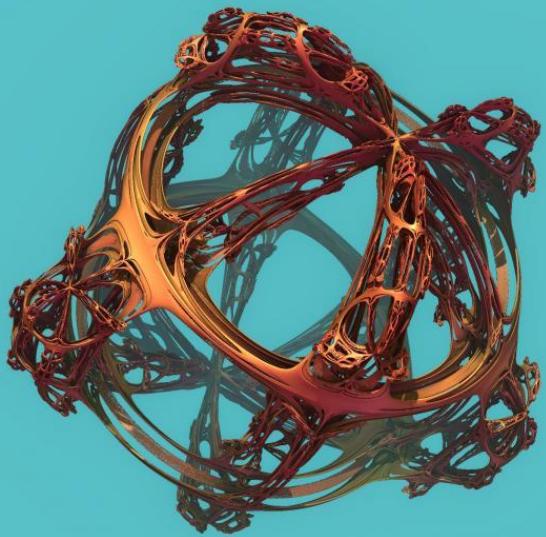
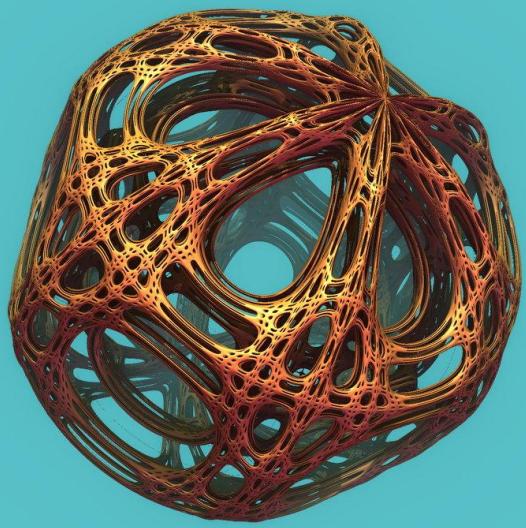
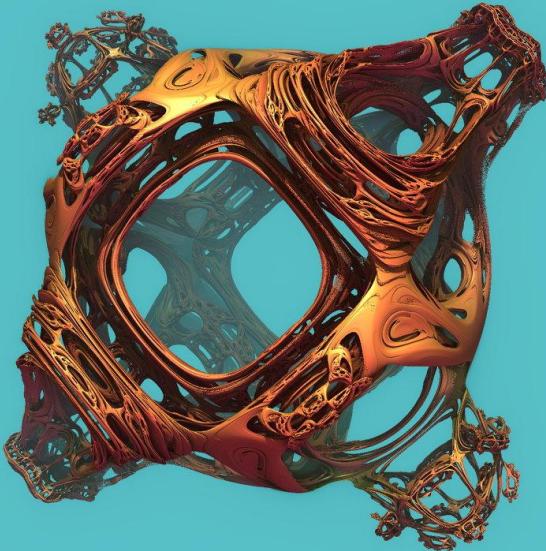
Left object Cutout for $z=0$



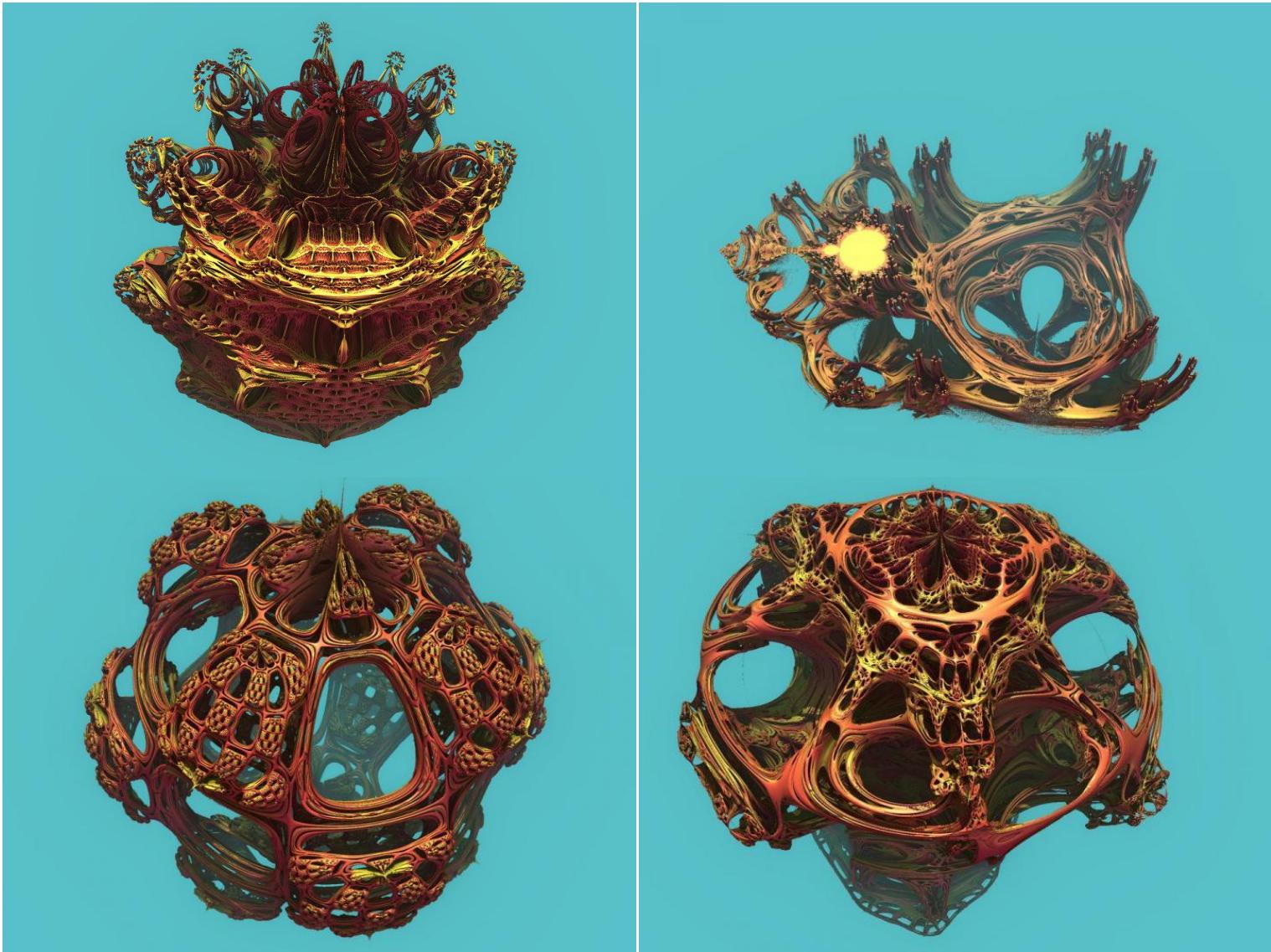
A Lambda Julia set



<https://fractalforums.org/index.php?topic=4675.msg33811#msg33811>



<https://fractalforums.org/index.php?topic=4675.msg33824#msg33824>



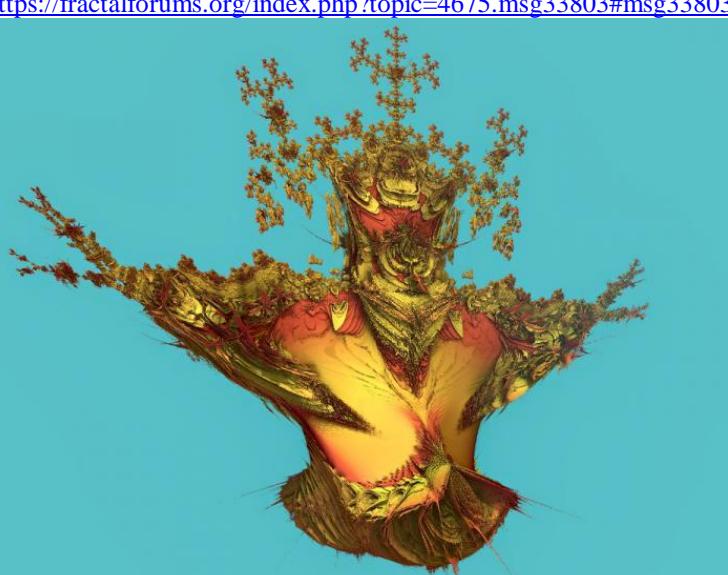
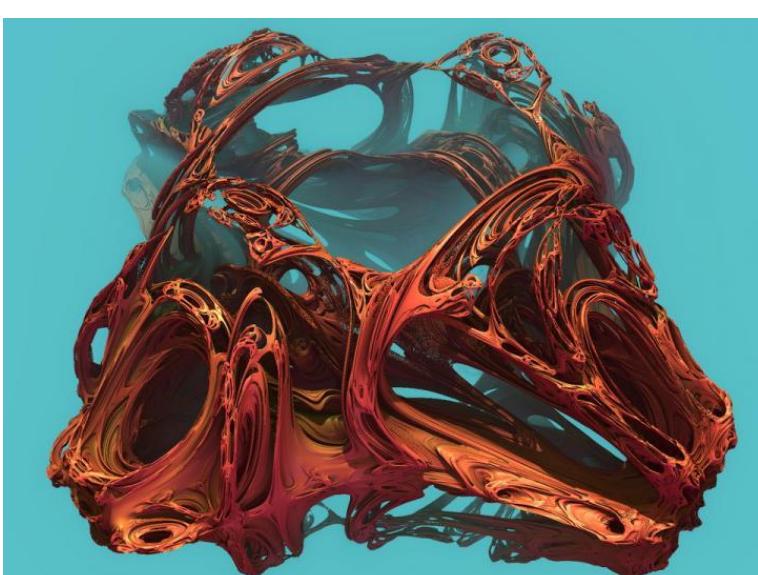
3D Tails Mandelbrot rendering

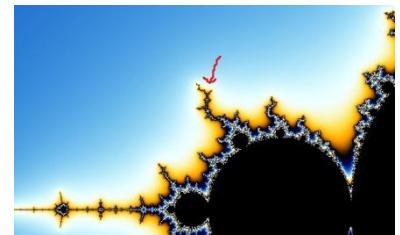
<https://fractalforums.org/fractal-mathematics-and-new-theories/28/3d-fractals-extending-complex-number-to-spaces-with-high-dimensions/4675/msg33798#msg33798>

$$\text{General equation } z_{+1} = S \left((z^3 + c) + \frac{1}{z^3 + c} \right) + E$$

Crown Mandelbrot

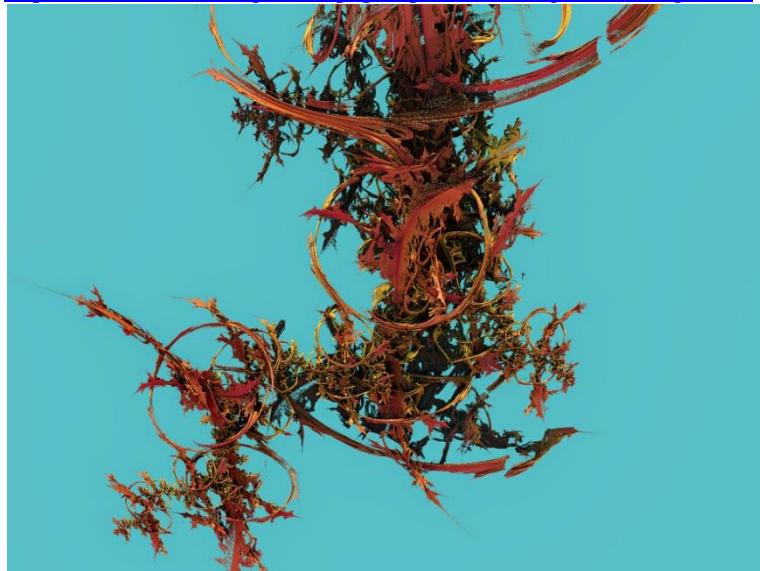
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Zoom on a detail of a 3D Mandelbrot set power 2

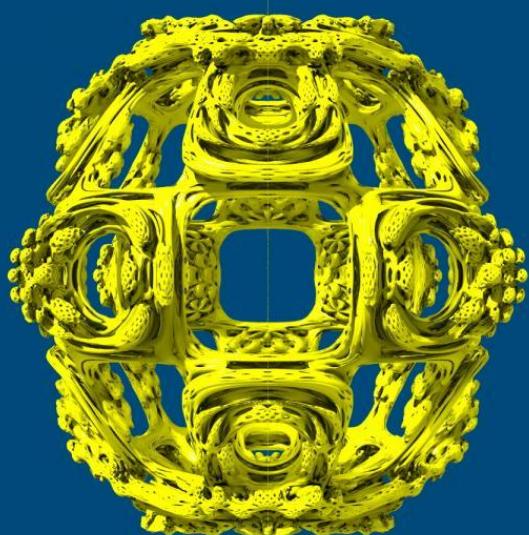
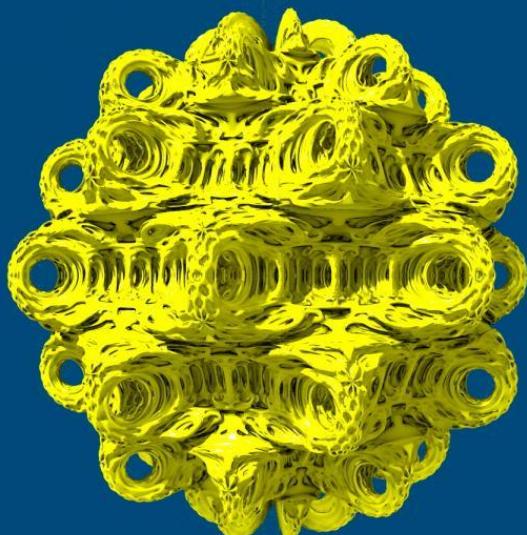
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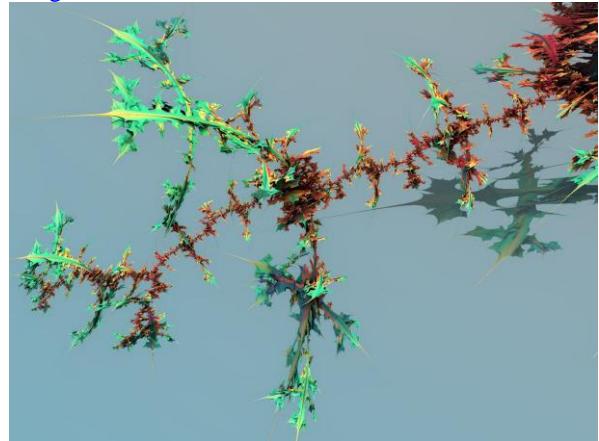


Animation of several objects

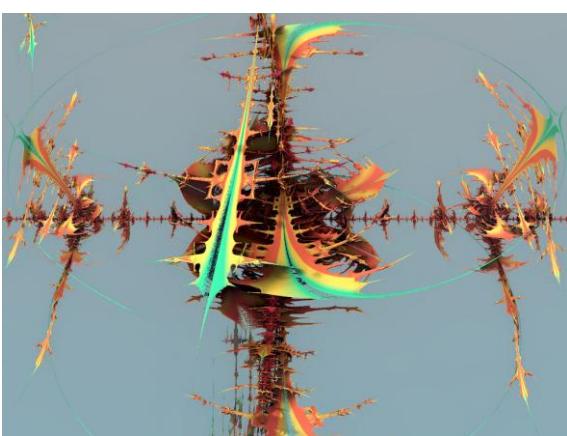


For summary

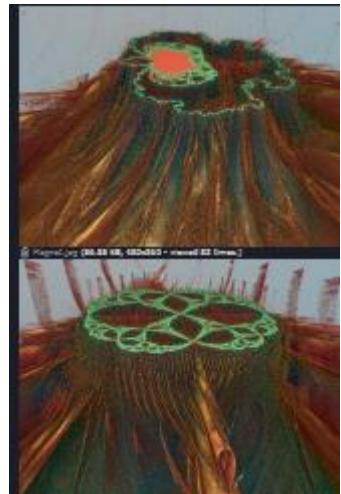
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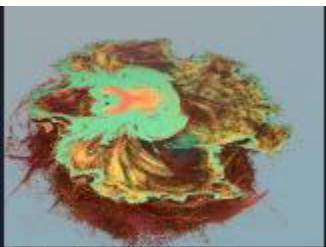
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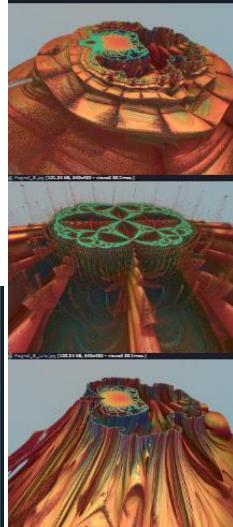
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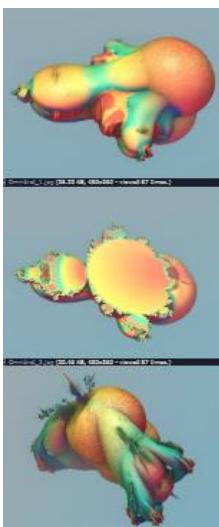
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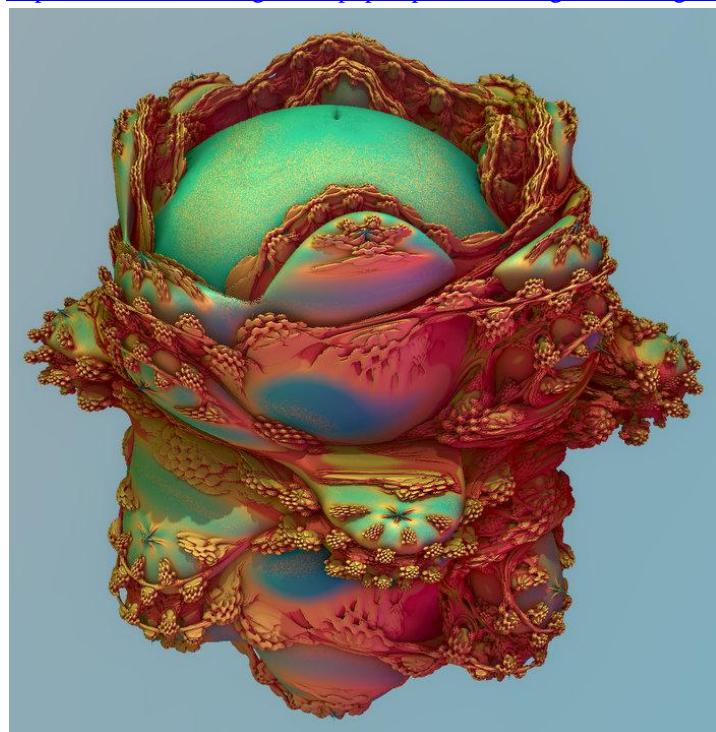
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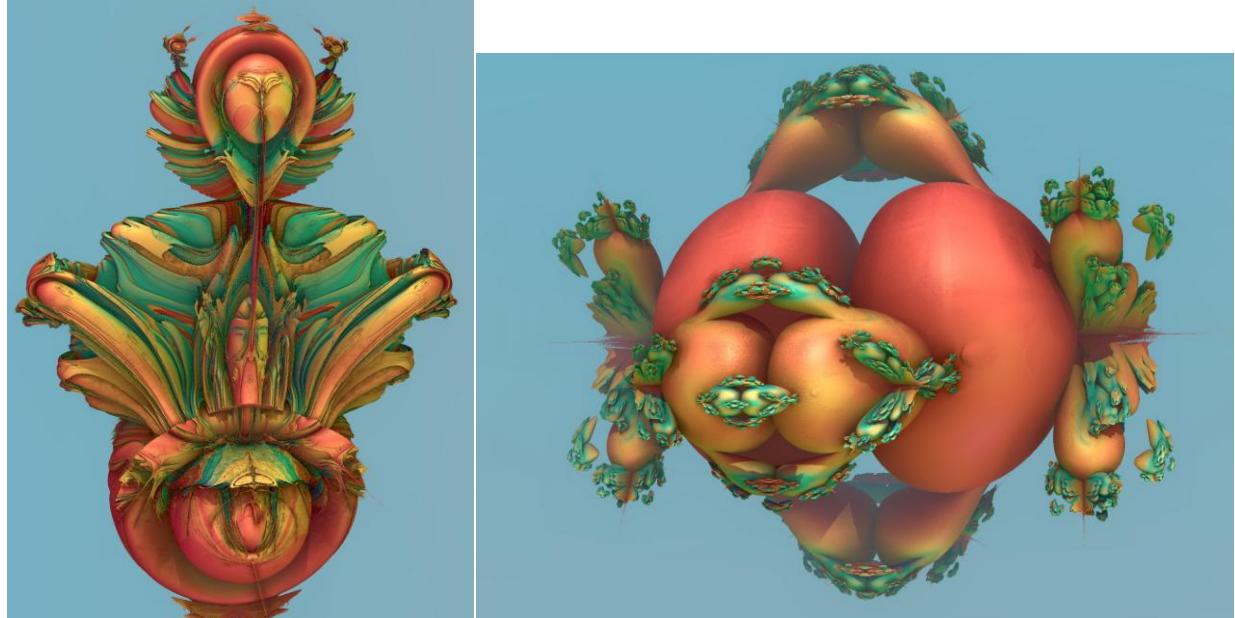
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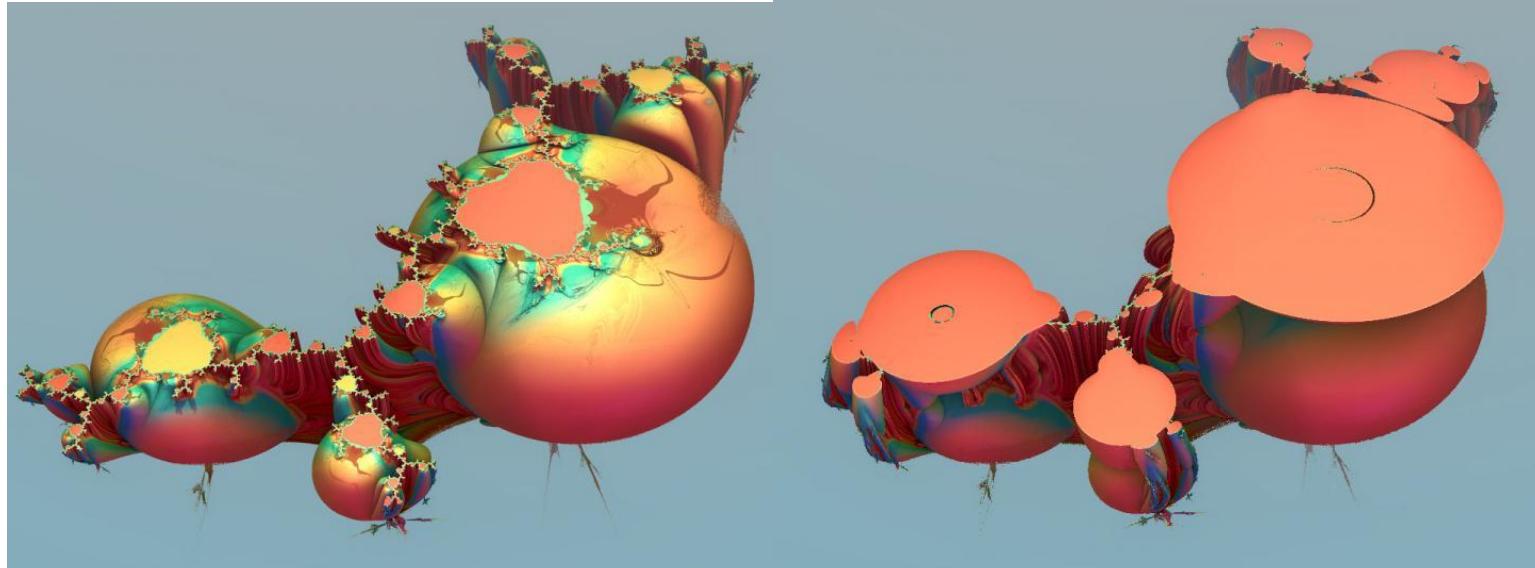
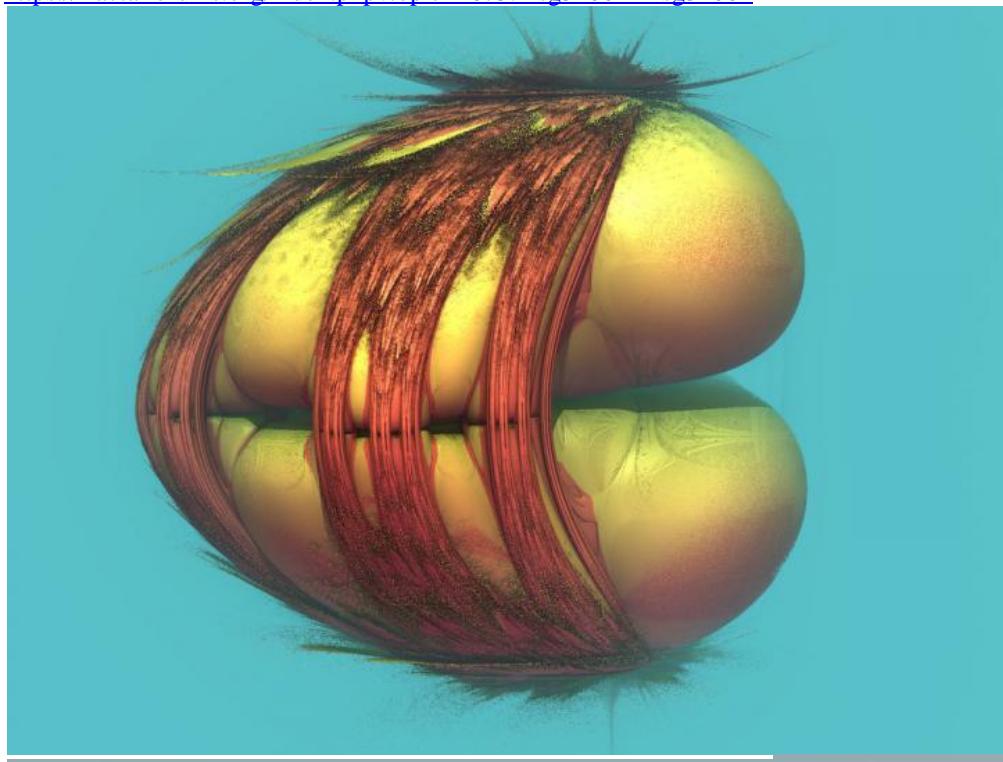
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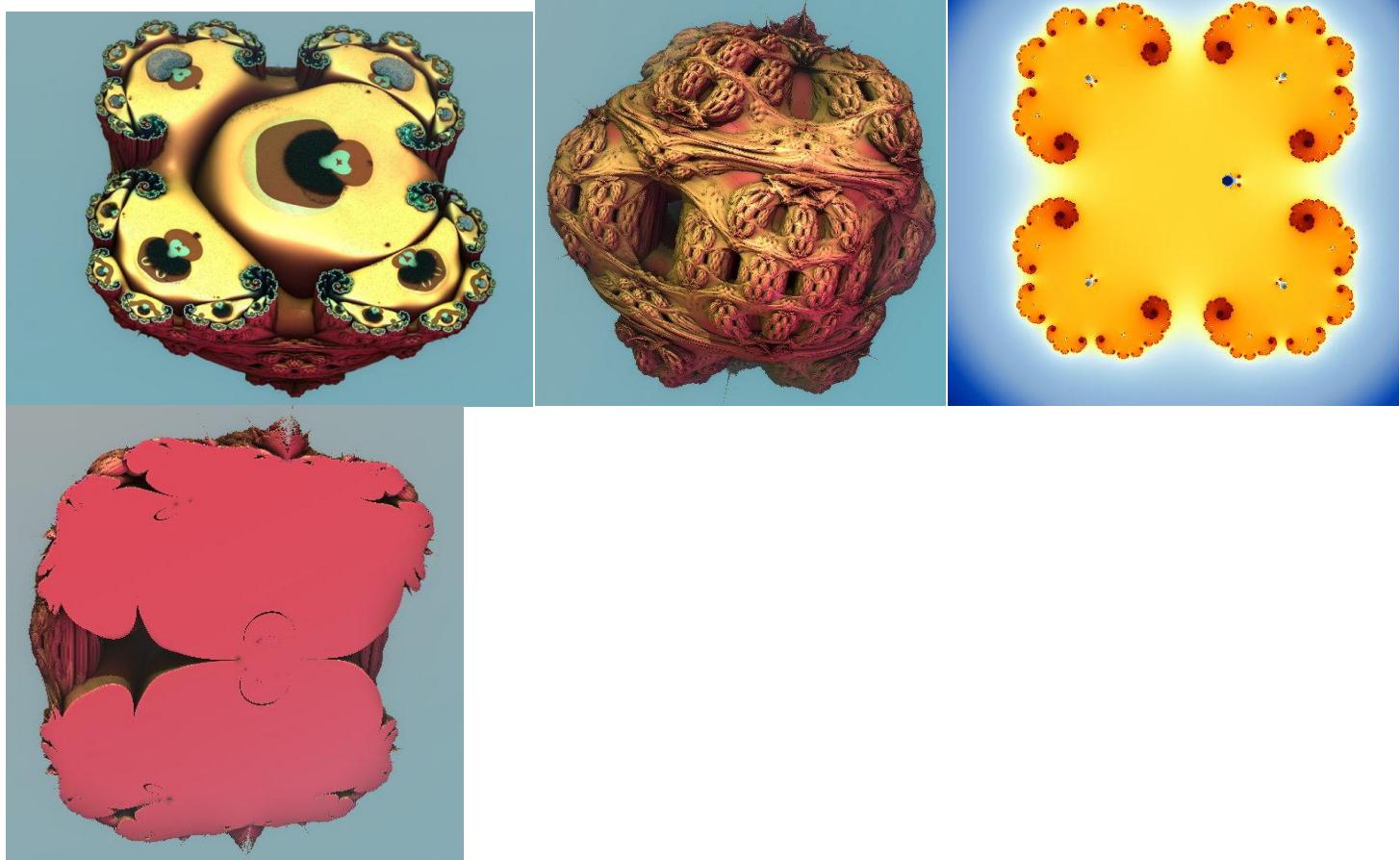
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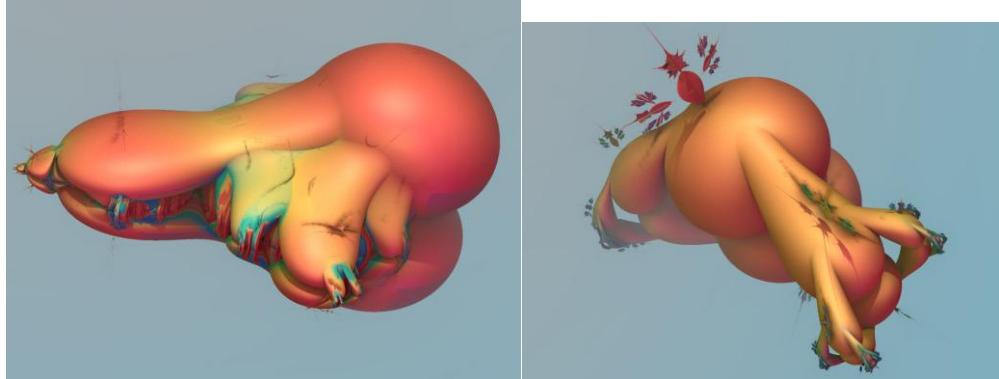
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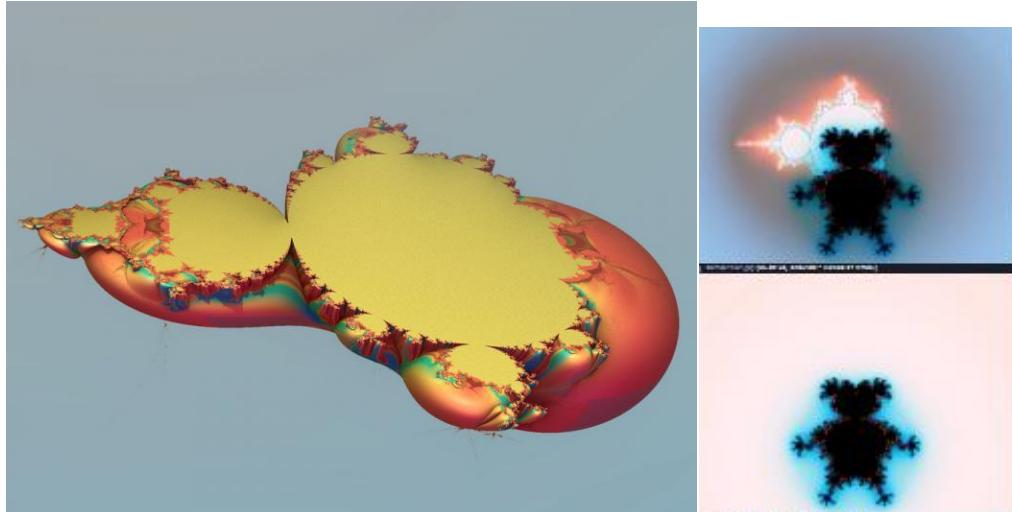
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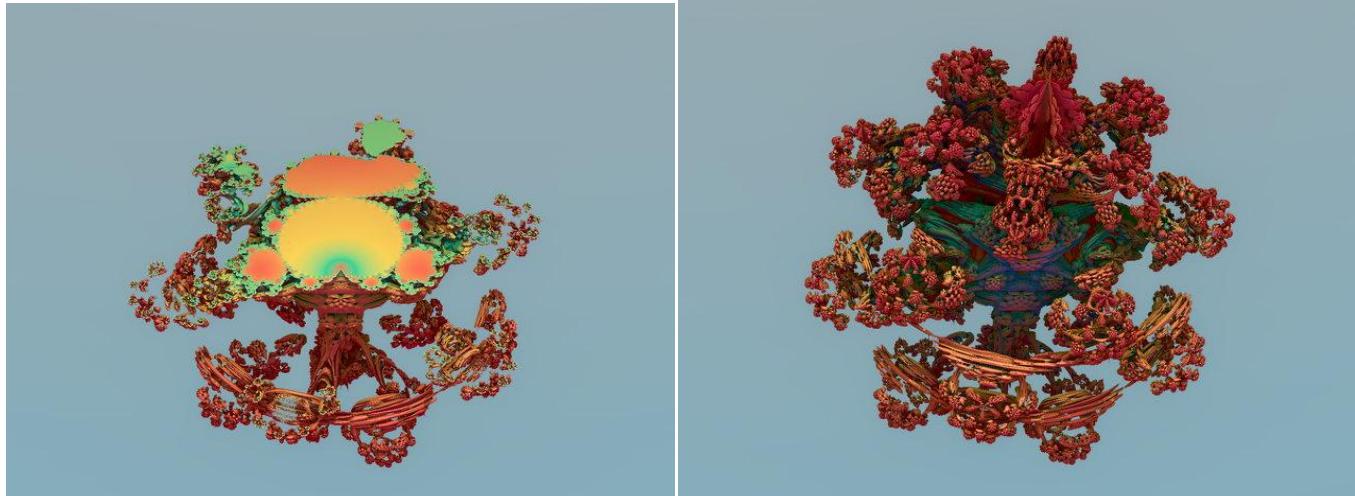
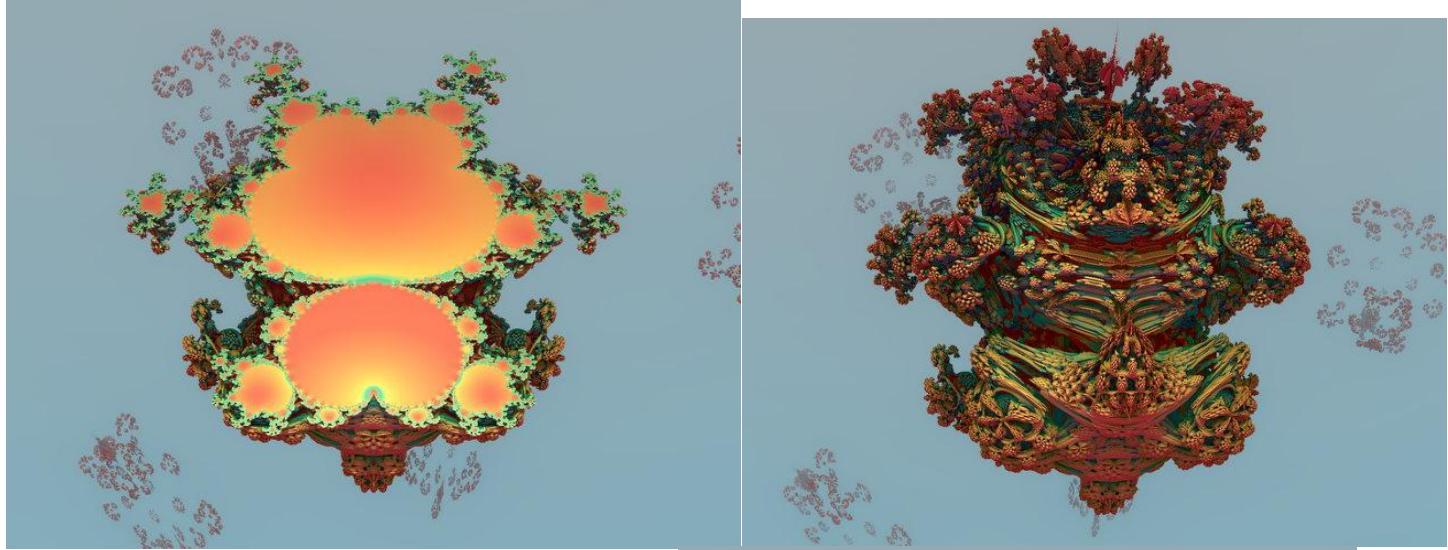
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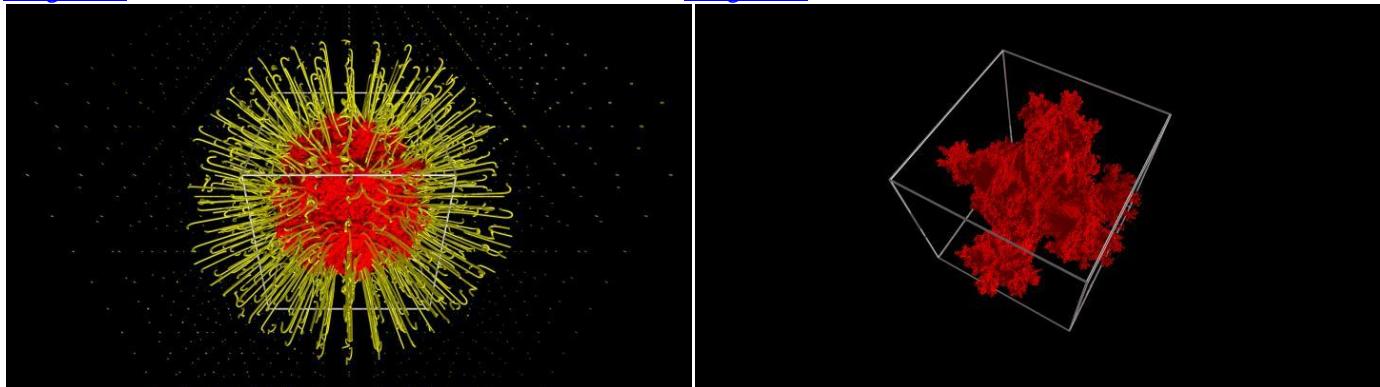


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[#msg34198](#)

[#msg34200](#)



<https://fractalforums.org/index.php?topic=4675.msg34265#msg34265>

